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EXAMINER

HOFFBERG, ROBERT JOSEPH

ART UNIT	PAPER NUMBER
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2835

DATE MAILED: 07/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/717,522	Applicant(s) ASAI ET AL.	
	Examiner Robert J. Hoffberg	Art Unit 2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,6-8 and 14-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,6-8 and 14-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

Response to Arguments

1. Applicant's arguments with respect to amended claims 1, 4, 6-7 and 14-20 have been considered but are moot in view of the new ground(s) of rejection below.
2. Applicant's arguments with respect to claim 8 have been fully considered but they are not persuasive. With respect to applicant's arguments regarding using prior art reference Brown (US 4,729,061). The examiner respectfully disagrees. Applicant's arguments against the prior art references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The primary reference Shin et al. (US 6,275,374) teach a hole in a circuit board for receiving a heat conducting terminal that is connected to a protective case. The primary reference Shin et al. fail to teach the construction of the circuit board. Secondary reference Brown teaches a circuit board construction having first and second conductive layers. Brown discloses at Col. 4, lines 41-45, that first and second conductive layers are used in conjunction to form a continuous heat path. Both references are in the same analogous art as the applicant's claimed invention and are seek to solve the same problem of heat dissipation of an electronic component.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goto (JP 2000-012112), in view of Dörfler et al. (US 6,605,778).

With respect to Claim 1, Goto teaches a heat-dissipation device for dissipating heat produced by at least one electronic component (#11) of an electronic control device, wherein the electronic control device includes a circuit board (#5) having the electronic component mounted thereon, and a protective case (#7) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (Fig. 1) connected to the circuit board in a position proximate (see Fig. 3b) to the electronic component, so that the heat (Para. 004, line 1) of the electronic component is transferred or conducted to the heat conductive terminal; wherein the heat conductive terminal comprises: a first end portion (#31) connected to the protective case in order to thermally conduct the heat to the protective case; and a second end portion (#11) inserted into an insertion hole (see Fig. 3b) formed in the circuit board so as to be connected to an inner wall of the insertion hole. Goto fails to teach a first and second heat conductive layers and a first and second electrically conductive layers on or within the circuit board. Dörfler et al. teach a first heat conductive layer (Fig. 4, #16) formed on the inner wall of the insertion hole (see Fig. 4), and at least one second heat conductive layer (Fig. 4, #13, #11 and #14) disposed on or within the circuit board (Fig. 4, #2) and connected to the first heat-conductive layer (Col. 3, lines 18-22) so that the heat conducted or transmitted from the electronic component (Fig. 4, #5) to the at least

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one second heat conductive layer and connected to the first conductive layer and is further conducted to the heat conductive terminal (Fig. 4, #7'), wherein the at least one second heat conductive layer includes a top heat conductive layer (#13), at least one intermediate heat conductive layer (#11), and a bottom heat conductive layer (#14), that are disposed on (see Fig. 4) a top surface (#2 top), an intermediate region (#10), and a bottom surface (#2 bottom) of the circuit board, respectively. With respect to Claim 6, Dörfler et al. further teach that the circuit board further having at least one through hole (Col. 3, line 17, through hole) formed in the circuit board extending throughout the thickness of the circuit board and disposed in close proximity (see Fig. 4) to the electronic component, additionally includes: a first electrical conductive layer (#16) formed on an inner wall of the through-hole; and a plurality of second electrically conductive layers (Fig. 4, #13, #11 and #14) including a top electrically conductive layer (#13), at least one intermediate electrically conductive layer (#11), and a bottom electrically conductive layer (#14) that are disposed on (see Fig. 4) a top surface, an intermediate region, and a bottom surface of the circuit board, respectively, wherein at least two of the second electrical conductive layers are connected to each other via the first electrically conductive layer (Col. 3, lines 18-22). With respect to Claim 7, Dörfler et al. further teach that the top electrically conductive layer is connected to (Col. 3, lines 31-32 and Col. 3, lines 18-22) at least one of the intermediate electrically conductive layer and the bottom electrically conductive layer, so that the heat produced (Col. 3, lines 22-24) by the electronic component is conducted to the top electrically conductive

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layer and then to the at least one of the intermediate electrically conductive layer and to the bottom electrically conductive layer, via the first electrically conductive layer.

With respect to Claim 4, Goto further teaches that the second end (#1) portion of the heat conductive terminal (#6) is connected to the first heat conductive layer by a soldered portion (Para. 0011, line 3, soldering part).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat dissipating device of Goto with the circuit board of Dörfler et al. for the purpose of providing a circuit board with heat conductive layers to reduce the thermal resistance in order to increase heat dissipation (Col. 1, lines 55-57).

5. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goto (JP 2000-012112), in view of Dörfler et al. (US 6,605,778) and further in view of Roessler et al. (US 6,212,071).

With respect to Claim 14, Goto in view of Dörfler et al. teach a heat-dissipating device as in claim 1, and Goto further teaches that the protective case (#7) wherein the circuit board (#5) is mounted to and within (see Fig. 3b) the case body. Goto in view of Dörfler et al. discloses the claimed invention except for a case body and a case cover. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the case body and case cover into a single unit, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893). With respect to Claim 15, Goto further teach a heat-dissipating device (Para. 0005). Goto in view of Dörfler et al. fail to disclose a case

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material. Roessler et al. teach wherein the protective case is made of metal (Col. 2, line 61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Goto in view of Dörfler et al. with the case of Roessler et al. to use a metal as a good heat conductive material to dissipate heat away from the electrical components to the outside environment.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shin et al. (US 6,275,374), in view of Brown (US 4,729,061) and further in view of Roessler et al. (US 6,212,071).

With respect to Claim 8, Shin et al. teach a heat-dissipating device for dissipating heat produced by at least one electronic component (Fig. 2, #24) of an electronic control device (Fig. 2, #100), wherein the electronic control device includes a circuit board (Fig. 2, #30) having the electronic component mounted thereon, and a protective case (Fig. 2, #84) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (Fig. 2, #42) connected to the circuit board in a position proximate (see Fig. 2) to the electronic component, so that the heat (Col. 6, lines 44-45) of the electronic component is transferred or conducted to the heat conductive terminal; wherein the heat conductive terminal comprises: a first end portion (Fig. 2, #42 bottom) connected to the protective case in order to thermally conduct the heat to the protective case, and a second end portion (Fig. 2, #42 middle) inserted into an insertion hole (Fig. 2, #30 for #42) formed in the circuit board so as to be connected to an inner wall (see Fig. 2) of the insertion hole and disposed in close proximity (see Fig. 2) to the electronic component. Shin et al. fail to teach a first and second conductive layers on or within the

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circuit board. Brown teaches a first conductive layer (Fig. 1, #42) formed on the inner wall of the hole, and second conductive layers (Fig. 1, #112, #132 and #134) including a top conductive layer (Fig. 10, #112), at least one intermediate conductive layer (Fig. 10, #132), and a bottom conductive layer (Fig. 10, #134) disposed on a top surface (Fig. 10, upper part of #100), an intermediate region (Fig. 10, #130), and a bottom surface (Fig. 10, #134) of the circuit board (Fig. 10, #100), respectively, the some of the second conductive layers being connected (see Fig. 10) to the first conductive layer so that heat or electrical signals conducted or transmitted from the electronic component to the second conductive layers is further conducted to either a conductive terminal (Fig. 1, #44) and/or at least one through hole (Fig. 10, #160) formed in the circuit board extending throughout the thickness of the circuit board. While Shin et al in view of Brown fail to show a second set of conductive layers, it would have been obvious to one skilled in the art that the set of conductive layers could be duplicated having one set for heat conduction and the other for electrical conduction. It is been held that duplication of parts is within the ordinary skill of the art. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the device of Shin et al. with that of Brown for the purpose of providing a circuit board with electrical and thermal layers to maximize the dissipation of heat and route the electrical signals to the desired components. Shin et al. in view of Brown fail to teach that second heat and electrical layers of the circuit board are on the same surface or region and are made of the same material, formed simultaneously with each other, and separated from each other electrically. Roessler et

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al. teach wherein the second heat conductive layer (Fig. 1, #28) and the second electrical conductive layer (Fig. 1, #26) disposed on the same surface or region (Col. 2, lines 26-28) of the circuit board (Fig. 1, #12) are made of the same material (Col. 2, line 39, copper), and separated (Col. 2, lines 46-49) from each other electrically. While Roessler et al. teach that both the electrical and heat conductors are formed during manufacture of the circuit board, it would be obvious to one of ordinary skill in the art at the time of the invention that the electrical and heat conductors being of the same material and on the same surface would be formed simultaneously with each other to minimize costs. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat dissipating device of Shin et al. with the circuit board configurations of Brown and Roessler et al. for the purpose of minimizing costs of the circuit board by using common materials and manufacturing techniques to produce both the heat and electrical layers simultaneously in the fabrication process.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Goto (JP 2000-012112), in view of Dörfler et al. (US 6,605,778) and further in view of Okuhata et al. (JP 03-268475).

With respect to Claim 16, Goto teaches a heat-dissipating device for dissipating heat produced by at least one electronic component (#11) of an electronic control device, wherein the electronic control device includes a circuit board (#5) having the electronic component mounted thereon and a protective case (#7) substantially confining the circuit board, the heat dissipation device comprising: a heat conductive terminal (see Fig. 1) connected to the circuit board in a position proximate (see Fig. 3b)

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to the electronic component, so that the heat (Para. 0004, line 1) of the electronic component is transferred or conducted to the heat conductive terminal, wherein the heat conductive terminal further comprises a first end portion (#31) connected to the protective case in order to thermally conduct the heat to the protective case, and a second end portion (#11) inserted into an insertion hole (see Fig. 3b) formed in the circuit board so as to be connected to an inner wall of the insertion hole. Goto fails to teach a first and second heat conductive layers and a first and second electrically conductive layers on or within the circuit board and heat conductive terminal with projections. Dörfler et al. teach a first heat conductive layer (Fig. 4, #16) formed on the inner wall of the insertion hole (see Fig. 4), and at least one second heat conductive layer (Fig. 4, #13, #11 and #14) disposed on or within the circuit board (Fig. 4, #2) and connected to the first heat conductive layer so that the heat conducted or transmitted (Col. 3, lines 18-22) from the electronic component (Fig. 4, #5) to the at least one second heat conductive layer is further conducted to the heat conductive terminal (Fig. 4, #7'), wherein the at least one second heat conductive layer comprises a top heat conductive layer (#13) on the top surface of the circuit board and a bottom heat conductive layer (#14) on the bottom surface of the circuit board. With respect to Claim 17, Dörfler et al. further teach that the at least one second heat conductive layer further includes at least one intermediate heat (#11) conductive layer disposed on an intermediate region (#10) of the circuit board. With respect to Claim 18, Dörfler et al. further teach the circuit board further having at least one through hole (Col. 3, line 17, through hole) formed in the circuit board extending throughout the thickness of the

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circuit board and disposed in close proximity (see Fig. 4) to the electronic component, additionally includes: a first electrical conductive layer (#16) formed on an inner wall of the through-hole; and a plurality of second electrically conductive layers (Fig. 4, #13, #11 and #14) including a top electrically conductive layer (#13), at least one intermediate electrically conductive layer (#11), and a bottom electrically conductive layer (#13) that are disposed on a top surface (#2 top), an intermediate region (#10), and a bottom surface (#2 bottom) of the circuit board, respectively, wherein at least two of the second electrical conductive layers are connected to (Col. 3, lines 18-22) each other via the first electrically conductive layer. With respect to Claim 19, Dörfler et al. further teach that the top electrically conductive layer is connected to (Col. 3, lines 31-32 and Col. 3, lines 18-22) at least one of the intermediate electrically conductive layer and the bottom electrically conductive layer, so that the heat produced (Col. 3, lines 22-24) by the electronic component is conducted to the top electrically conductive layer and then to the at least one of the intermediate electrically conductive layer and to the bottom electrically conductive layer, via the first electrically conductive layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Goto with the circuit board configuration of Dörfler et al. to couple multiple heat conductor layers to reduce thermal resistance and increase thermal dissipation. Goto in view of Dörfler et al. fail to teach the first and second protrusions on the second end portion of the terminal. Okuhata et al. teach a terminal that has the second end portion (#4) further includes; a first protrusion (#5) contacting a top surface of the circuit board (#9 top), a second protrusion (#6)

contacting a bottom surface of the circuit board (#9 bottom), and wherein the terminal is fixed in position (see Fig. 2) relative to the insertion hole via the first and second protrusions, wherein the second end portion directly contacts (see Fig. 3) the a hole in the circuit board; and wherein the first and second protrusions are made of the same material (see Fig. 1) as the second end portion and are formed integrally (see Fig. 1) with the second end portion and wherein the first and second protrusions respectively contact the top surface of the circuit board and the bottom layer of the circuit board and are formed by cutting and bending (see Fig. 2) pads of the terminal. While Goto in view of Dörfler et al. in further view of Okuhata et al. fail to disclose that the second end of the heat conductive terminal directly contacts the first heat conductive layer, it would be obvious to one skilled in the art at the time of the invention, that the terminal of Okuhata et al. will contact the inside surface (hole) of first conductive layer in printed circuit board of Dörfler et al.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat dissipation device of Goto in view of Dörfler et al. with the terminal of Okuhata et al. for the purpose of minimizing the cost of the terminal by providing a monolithic construction that has opposing protrusions to insure thermal contact with the first heat conductive layer to increase heat dissipation.

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Goto (JP 2000-012112), in view of Dörfler et al. (US 6,605,778) further in view of Okuhata et al. (JP 03-268475) as applied to the above claims, and further in view of Roessler et al. (US 6,212,071).

Goto in view of Dörfler et al. and further in view of Okuhata et al. teach a heat-dissipating device as in claim 19 above. Goto further teaches that the protective case (#7) wherein the circuit board (Fig. 2, #30) is mounted to and within the case body.

Goto in view of Dörfler et al. and further in view of Okuhata et al. discloses the claimed invention except for a case body and a case cover. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the case body and case cover into a single unit, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893). Goto in view of Dörfler et al. in further view of Okuhata et al. fail to disclose that the case body is made of metal. Roessler et al. teach that the protective case is made of metal (Col. 2, line 61). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the heat-dissipating device of Goto in view of Dörfler et al., further in view of Okuhata et al. with the case of Roessler et al. to use a metal as a good heat conductive material to dissipate heat away from the electrical components to the outside environment.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert J. Hoffberg whose telephone number is (571) 272-2761. The examiner can normally be reached on 8:30 AM - 4:30 PM Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RJK RJK

Michael Datnowsky

06/29/06

**MICHAEL DATNOWSKY
PRIMARY EXAMINER**